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Earth and Environmental Sciences for Future Generations

IAVCEI (Volcanology, Geochemistry)

VS10/VS11/VS31 Probabilistic Volcano Hazard Analysis / Short-Term Forecasting of Volcanic Hazard: So Far, So Good? / Quantifying and Communicating Uncertainty During Volcanic Crisis

30-Jun-2015, 15:00 - 16:30

Abstract content:

Detection of volcano unrest from multiparameter pattern classification

Short-term forecasting of volcanic unrest requires high-rate/continuous data acquisition and monitoring of multidisciplinary data. Volcano Observatories worldwide usually adopt various tools for the automatic processing of geophysical and geochemical data streams to detect changes heralding impending eruptive activity. Here we discuss the application to multivariate data sets of a free software named KKAnalysis. The software is one of the data mining tools of the European MEDiterranean Supersite Volcanoes (MEDSUV) project, and carries out the pattern classification of data of whatever nature provided in numerical format. We explain how this software works combining Self-Organizing Maps and fuzzy clustering. Beside numerical log files, changes of pattern characteristics are visualized as output of KKAnalysis in graphical form, by creating a sequence of colored symbols. This convenient color code highlights the development in time of the characteristics of whatever multidimensional feature vector. We also present results of applications to seismic data (volcanic tremor), in-soil radon activity, and ambient parameters (barometric pressure and air temperature measurements acquired at the same site of the radon data). We explore these applications at Mt. Etna, Italy, in time spans of various duration (from months to years), in which eruptive activity ranged from short-lived (usually from tens of minutes to hours) lava fountains to long-lasting (from months to years) lava effusions.

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Keywords:
volcano monitoring pattern classification data mining methods volcanic tremor in-soil Radon activity Etna

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